B R I A N   H S U

Department of Astronomy & Steward Observatory
University of Arizona
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Tucson, AZ 85721   bhsu@arizona.edu

Education

University of Arizona   Tucson, AZ
Ph.D. in Astronomy and Astrophysics   2023 – present
   Advisor: Prof. Nathan Smith

Harvard University   Cambridge, MA
A.B. in Astrophysics and Physics, secondary in Mathematical Sciences   2018 – 2023
   Cum Laude with Highest Honors in Field
   GPA: 3.881/4.0
   Thesis Title: The Offset and Host Light Distributions of Superluminous Supernovae: Archival Deep Dive with the *Hubble Space Telescope*
   Advisors: Prof. Edo Berger and Dr. Peter K. Blanchard

Bayside High School   Bayside, NY
Advanced Regents Diploma with Honors   2014 – 2018
   GPA: 103.36/100

Research Experience

Experienced with light curve modeling of type I superluminous supernovae with a magnetar central engine using open-source MCMC Python software MOSFiT. Performed population analysis on the engine and ejecta properties using Bayesian inference. Currently analyzing the host galaxy properties of superluminous supernovae with images from the *Hubble Space Telescope* (*HST*) to help discern progenitor populations and establish connections to other rare transients. Other research interests include **science communication, outreach, and accessibility**.

NASA's Chandra X-ray Observatory   Cambridge, MA
Research Assistant   Sep 2022 – May 2023
Advisor: Dr. Kimberly Kowal Arcand
Projects pursued:
1. Women in STEM Interview Analysis: Encouraging young female learners in STEM pathways (co-authored publication)
2. A Universe of Sound: Processing NASA Data into Sonifications to Explore Participant Response (in preparation)
3. Colorblind Study: How Does Colorblindness Affect Perception of Astronomical Images?

Berger Cosmic Transients Lab   Cambridge, MA
Undergraduate Research Fellow   May 2020 – July 2023

Advisors: Dr. Edo Berger (Harvard University), Dr. Griffin Hosseinzadeh (University of Arizona), Dr. V. Ashley Villar (Pennsylvania State University), and Dr. Peter K. Blanchard (Northwestern University)

Refereed Publications

1. **Hsu, B.**, Blanchard, P. K., Berger, E., Gomez, S. An Extensive *Hubble Space Telescope* Study of the Offset and Host Light Distributions of Type I Superluminous Supernovae. 2023, submitted to ApJ.
2. Arcand, K. K., et al. (incl. **Hsu, B.**). Women in STEM Interview Analysis: Encouraging young female learners in STEM pathways. 2022, *Communication, Society and Media*, 5(3), 17-48.
3. **Hsu, B.**, Hosseinzadeh, G., Villar, V. A., Berger, E. Photometrically-Classified Superluminous Supernovae from the Pan-STARRS1 Medium Deep Survey: A Case Study for Science with Machine Learning-Based Classification. 2022, *The Astrophysical Journal*, 937, 13.
4. **Hsu, B.**, Hosseinzadeh, G., Berger, E. Magnetar Models of Superluminous Supernovae from the Dark Energy Survey: Exploring Redshift Evolution. 2021, *The Astrophysical Journal*, 921, 180.
5. Eftekhari, T., et al. (incl. **Hsu, B.**). Late-time Radio and Millimeter Observations of Superluminous Supernovae and Long Gamma-Ray Bursts: Implications for Central Engines, Fast Radio Bursts, and Obscured Star Formation. 2021, *The Astrophysical Journal*, 912, 21.

Selected Honors and Grants

Thomas Temple Hoopes Prize — May 2023
Prize awarded by the Faculty of Arts and Science for excellent undergraduate thesis work

URAF Conference Funding Grant — Nov 2022
$1000 grant awarded by Harvard College to attend the 241st AAS meeting in Seattle, WA

FAMOUS Travel Grant — Jun 2022
$1000 grant awarded by AAS to attend the 240th AAS meeting in Pasadena, CA

Leo Goldberg Junior Prize in Astronomy — May 2021
Awarded by the Department of Astronomy in recognition of research promise as evidenced by a junior thesis

Harvard College Research Program Grant — May 2020 and 2022
$6000 grant awarded by Harvard College for 12-week long independent summer research

Teaching Experience

Mathnasium of Needham — virtual
Mathematics Tutor — Feb 2022 – Jun 2022
- Directed 30-minute sessions with students ages 8-15 using differentiated instruction
- Promoted student engagement with worksheets and examples of real-world application
- Provided constructive feedback on area of improvement to students and parents

Harvard University — Cambridge, MA
Team Leader, Math Fluency Initiative — Jun 2021 – Aug 2021

- Advised 15 prospective Harvard students with minimal math background
- Directed weekly group and one-on-one sessions to explain math concepts
- Devised individualized weekly learning plans with each student
- Monitored learning progress and provided constructive feedback

Undergraduate Teaching Fellow, ASTRON 16   Spring 2021, 2023
- Attended synchronous Zoom lectures and assisted students in breakout room sessions
- Graded and provided constructive feedback on assignments, projects, and exams
- Created weekly worksheets and implemented lesson plans in lectures
- Facilitated office hours to explain assignments and astronomy concepts

Course Assistant, MATH 21B   Sep 2019 – May 2021
- Attended in-person and Zoom lectures and assisted students during problem sessions
- Graded and provided constructive feedback on homework assignments
- Facilitated Math Question Center to help students with assignments
- Promoted student learning by organizing quiz sessions to reinforce classroom topics
- Arranged weekly meetings with course instructor to discuss student performance

Leadership and Membership

Treasurer, Harvard Men's Club Volleyball team	Sep 2022 –
Co-President, Harvard College Astronomical Society (AstroSoc)	May 2022 –
Member, American Astronomical Society (AAS)	Oct 2021 –
Treasurer, Harvard College Astronomical Society (AstroSoc)	Dec 2020 – May 2022
Member, Harvard College Astronomical Society (AstroSoc)	Sep 2019 –
Member, Harvard-Radcliffe Society of Physics Student (SPS)	Sep 2018 –
Member, Harvard Men's Club Volleyball team	Sep 2018 –

Outreach and Service

Pen Pal – **Letters to a Pre-Scientist**	Aug 2023
Cluster Leader and Mentor – AstroSoc Mentorship Program	2022 – 2023

Observing Experience

Harvard University 16" Clay Telescope
- Harvard Observing Project (5 nights)
  * The Harvard Observing Project (HOP) is an open-night style program designed for undergraduate student interested in astronomy to gain familiarity with observing and telescope operation.
- Imaging of the Perseus galaxy cluster (1 night)
- Imaging of the eclipsing binary NSVS01031772 (1 night)

Fred Lawrence Whipple Observatory 1.2m Telescope
- Imaging of asteroids and planetary nebulae with KeplerCam (1 night)

Harvard College Observatory 1.2m Millimeter-Wave Telescope
- Radial velocity detection of CO in the Galactic plane (120+ nights)

Work Experience

Starbucks, Lechmere Station   Cambridge, MA
Shift Manager   Jan 2022 – Aug 2022
- Managed and deployed shift teams to ensure the highest level of customer service
- Enhanced operations and boosted productivity through barista training and coaching
- Maintained a third-place environment for all customers through daily connections
- Addressed and resolved customer concerns by implementing de-escalation model
- Created schedules, accepted time off requests, and maintained coverage for shifts

Barista   Sep 2021 – Jan 2022
- Provided the Starbucks experience to all customers with high-quality service and products
- Crafted beverages to the highest standard by following the Starbucks recipe
- Ensured food safety through regular sanitation of working areas and equipment
- Maintained the highest conduct to support company mission and reputation

Harvard College Observatory   Cambridge, MA
Telescope Observer, Milli-Meter Wave Telescope   Nov 2019 – Mar 2020, Jan 2023 –
- Collected 500+ radio data on the 1.2-meter telescope at the Center for Astrophysics
- Performed routine maintenance with liquid hydrogen and liquid nitrogen
- Adhered to planned observatory opening and closing procedures

Harvard University Dorm Crew   Cambridge, MA
Cleaner   Aug 2018 – Nov 2018
- Upheld safety protocols by storing chemicals according to guidelines
- Cleaned 10+ bathrooms each week to maintain dormitory environment
- Adhered to a rotation schedule of assigned quadrants with co-workers as a team

Nippon Cha   Bayside, NY
Assistant Store Manager   May 2017 – Feb 2018
- Established sales goals, managed budgets, and devised sales forecasts
- Supervised crew to maintain the highest standards in service to maximize profit
- Assumed responsibility for cash tills and adhered to opening/closing procedures
- Created shift schedules, calculated cash tips, and handled payroll

Server   Oct 2016 – May 2017
- Served 10+ tables per night with an average revenue of $1200 generated
- Followed guidelines for allergy, diet concerns, and food safety regulations
- Assumed the role of primary barista for making Japanese-styled beverages and desserts
- Recommended house specialty items and beverages to first-time customers

Presentations and Talks

Conference Talks

"Photometrically-Classified Superluminous Supernovae from the Pan-STARRS1 Medium Deep Survey: A Case Study for Science with Machine Learning-Based Classification," 241st American Astronomical Society Meeting, Seattle, WA, January 8–12, 2023

"Photometrically-Classified Superluminous Supernovae from the Pan-STARRS1 Medium Deep Survey: A Case Study for Science with Machine Learning-Based Classification," Spoken-WERRD Meeting, virtual, November 2–4, 2022

"Magnetar Models of Superluminous Supernovae from the Dark Energy Survey: Exploring Redshift Evolution," 240th American Astronomical Society Meeting, Pasadena, CA, June 12–16, 2022

Invited Talks

"Magnetar Models of Superluminous Supernovae from the Dark Energy Survey: Exploring Redshift Evolution," BigBoom Meetings, University of Arizona, virtual, December 8, 2021

"Magnetar Models of Superluminous Supernovae from the Dark Energy Survey: Exploring Redshift Evolution," Supernova Journal Club, University of California, Davis, virtual, April 20, 2021

Posters

"Women in STEM Interview Analysis: Encouraging young female learners in STEM pathways," 241st American Astronomical Society Meeting, Seattle, WA, January 8–12, 2023

Workshops Attended

Software Carpentry Workshop, 241st AAS Meeting, Seattle, WA, January 7-8, 2023

Skills

Programming: Python, Mathematica, SQL, MESA (Modules for Experiments in Stellar Astrophysics), R

Technical: LaTeX, Microsoft Office Suite (Excel, Word, PowerPoint)

Language: English (Fluent), Mandarin (Native)